A disk drive has 19 surfaces. Storage area on each surface has an inner diameter of 22 cm and outer diameter is 33 cm. Maximum storage density on any track is 2000 bits/ cm and Inter-track space is 0.25 mm.
A)What is the storage capacity of the disk drive?
B) What is the data transfer rate in bytes per second at a rational speed of 3600 rpm?

No. of surfaces = 19
Inner track diameter = 22 cm
Outer track diameter = 33 cm
Total track width=(33-22)/2 cm = 5.5 cm
Inter-track space = 0.25 mm
No. of track in each surface = (5.5 x 10) / 0.25 =220
Minimum track circumference= π x 22 cm
Maximum track storage density = 2000 bits/cm, which will be on innermost track.
Data storage capacity per track = 22 x 3.14 x 2000 bits =138160 bits
Disk speed=3600 rpm
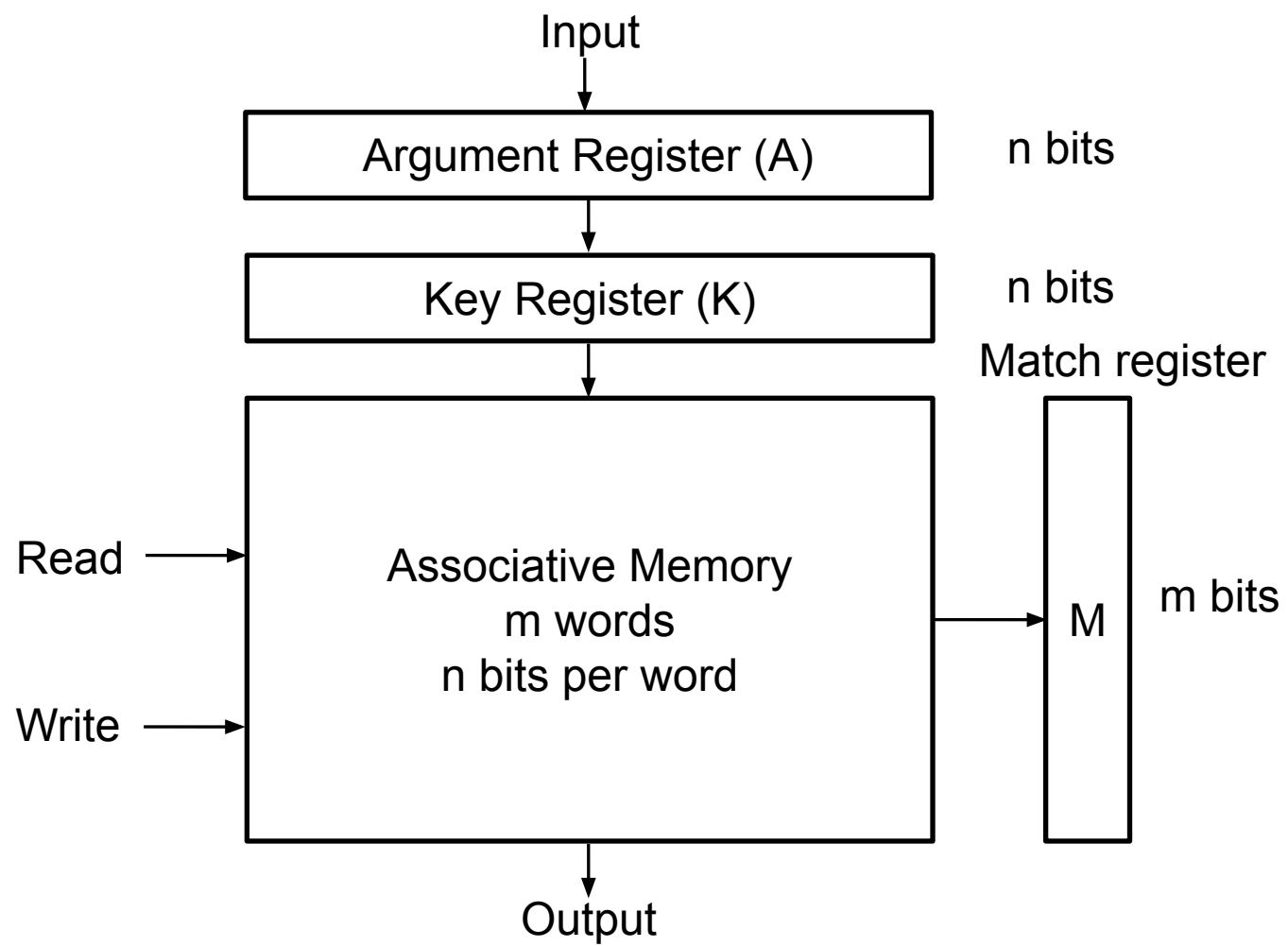Per second rotation = 3600/60 = 60
A) The storage capacity of disk drive = 19 x 220 x 138160 bits=72188600 Byte =72.18 MB
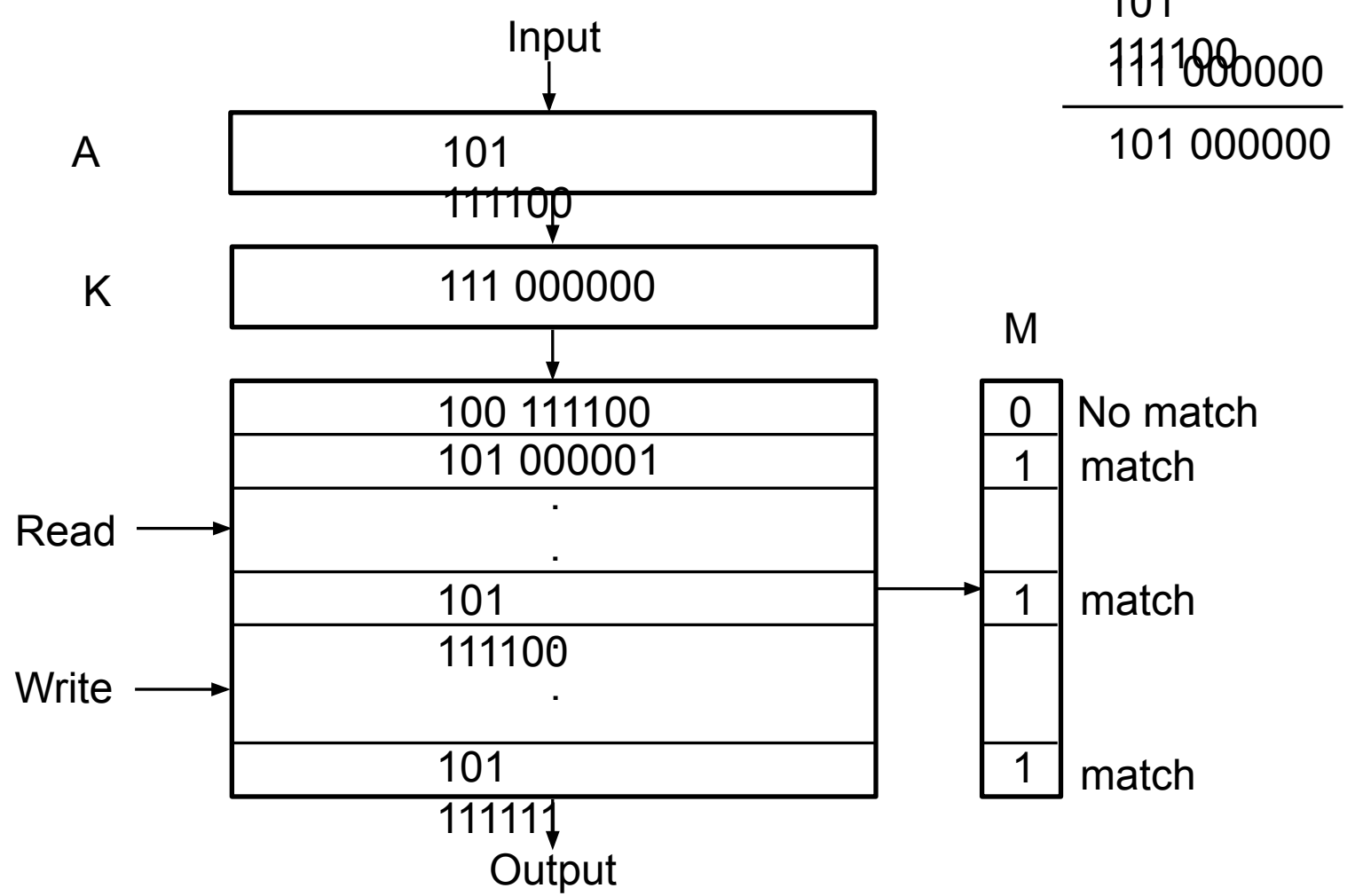B) The data transfer rate in Bytes per second = 60 x 138160 bits =1036200 Byte

Associative Memory (CAM) → Content Addressable Memory

Block diagram of associative memory

Associative Memory (CAM)

Bitwise AND

$$101$$
$$111100$$
$$111\ 000000$$
$$\overline{}$$
$$101\ 000000$$

Input

A	101 111100

K	111 000000

M

100 111100	0	No match
101 000001	1	match
.		
.		
101	1	match
111100		
.		
101	1	match

Read →

Write →

Output
111111

Functionality of associative memory

Associative Memory (CAM)

Masking operation

Bitwise AND

```
   101
   111100
   111

   111111
   101
   111100
```

Input

A

```
101
111100
```

K

```
111
111111
```

M

```
100 111100        0  No match
101 000001        0  No match
       .
Read               .
101               1  match
111100
       .
Write

101               0  No match
111111
```

Output
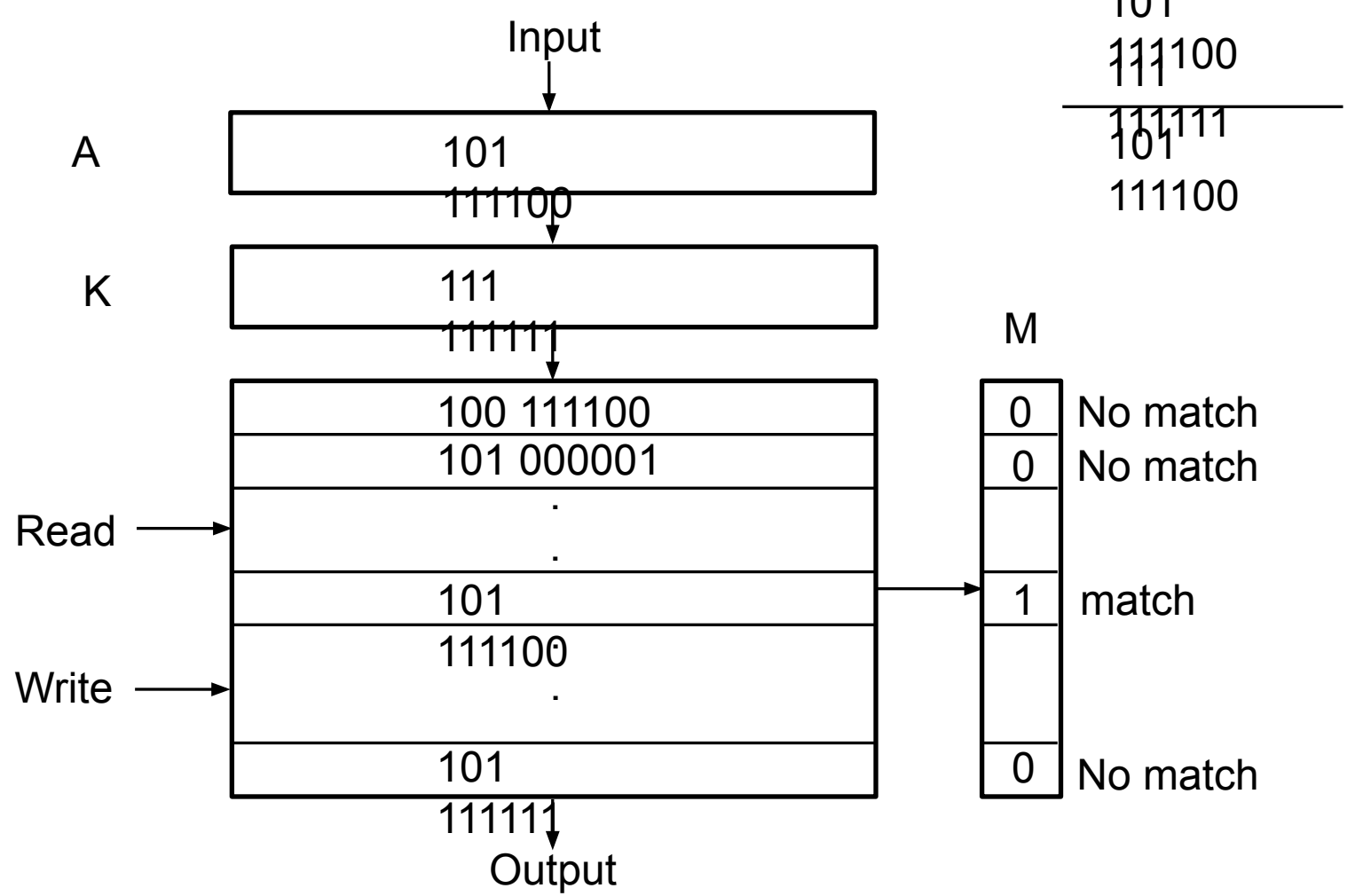
Functionality of associative memory

Functionality of associative memory

- It consists of a memory array for m words with n bits per word.
- The argument register A and key register K each have n bits.
- The match register M has m bits, one for each memory word.
- Each word in memory is compared in parallel with the content of the argument register.
- The key register provides a mask for choosing a particular field or key in the argument word.
- The entire argument is compared with each memory word if the key register contains all l's. Otherwise, only those bits in the argument that have l's in their corresponding position of the key register are compared.

- The words that match the bits of the argument register set a corresponding bit in the match register.
- After the matching process, those bits in the match register that have been set indicate the fact that their corresponding words have been matched.

Thank You